



ElectroCooler
Electric A/C System
for your Porsche 911

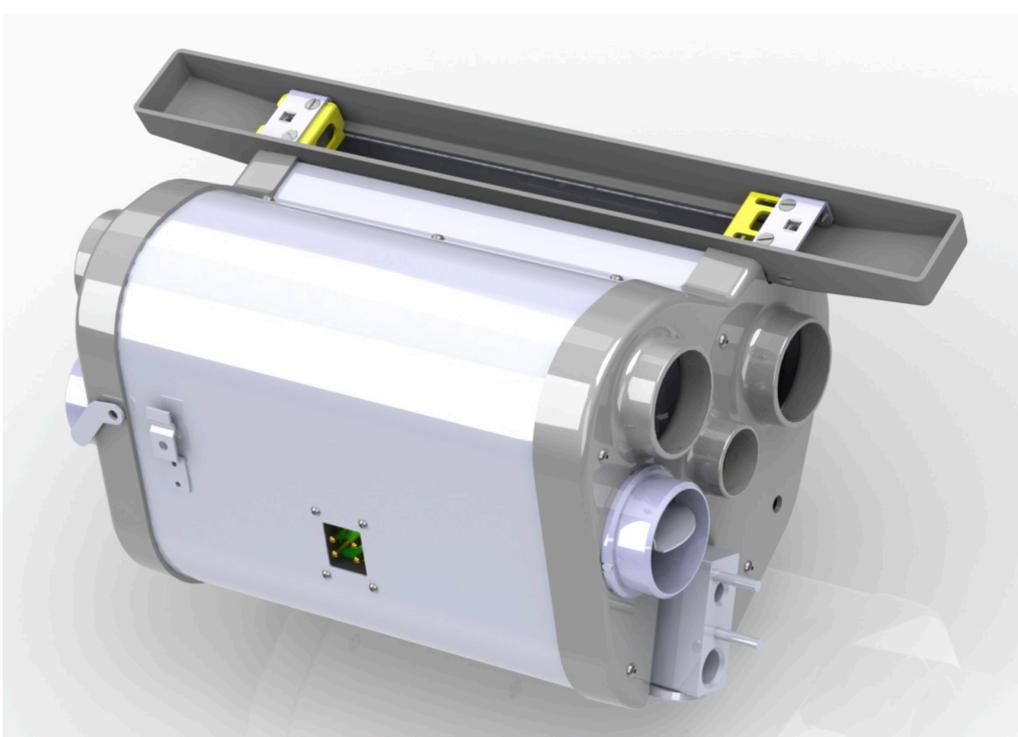


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Introduction

Welcome to the install manual for the Electrocooler Air Conditioning system for Porsche 911s. We hope that this manual is concise and clear but if you have any difficulty or suggestions on how to make the manual better, please contact us by email: info@classicretrofit.com

ElectroCooler Kit

The kit you have purchased contains the following parts:

- Electric A/C compressor and control ECU.
- Condenser, fan and shroud assembly.
- Replacement blower unit, housing modern fan and evaporator.
- Lightweight narrow wall hose set with custom fittings.
- ECU wiring loom and sundries.

We don't provide:

- 60mm air ducting (we recommend genuine Webasto aluminium/paper hose)
- Rubber grommets (for routing hoses and wiring)
- 'Oetiker' crimp pliers / pincers
- Replacement washer bottle.

If you think any of the parts are missing from your kit, please email us before you start installation.



Note: Prototype blower unit shown in photo.

System Overview

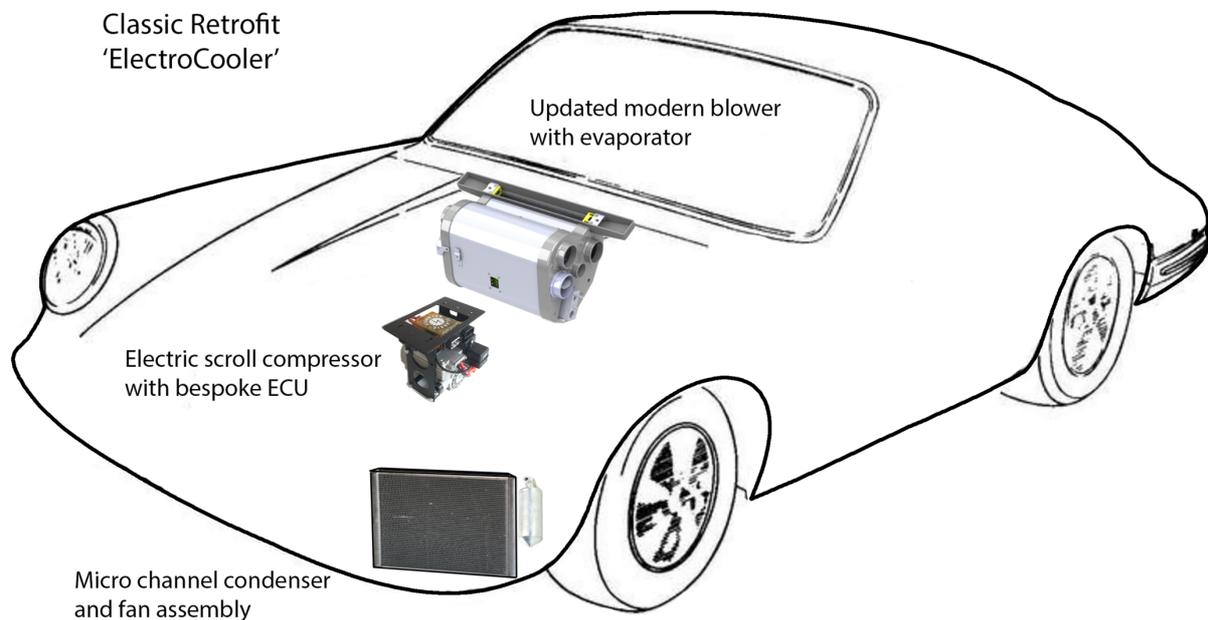
ElectroCooler is unique in the air conditioning marketplace as it dispenses with the traditional engine driven compressor.

This offers several advantages over traditional systems:

- Compact: entirely packaged in the front of the vehicle
- Lightweight: typically half the weight of a factory or dealer system
- Better weight distribution
- Simpler to install.
- Non-damaging: Does not require cutting holes in the body shell.
- More energy efficient: Uses typically < 1 HP.
- Saves fuel. (independent white papers show up to 15% fuel saving)

Core components

Typical placement of core components in a 911 bodyshell.



Note: Hoses and wiring harnesses not shown

Installation

Although the installation of the components can be safely undertaken on a DIY basis, when it comes to filling and commissioning of the system, it is essential to seek professional assistance.

Air conditioning hoses run at high pressure and must be correctly crimped and pressure tested with the correct equipment.

We recommend that the initial filling and commissioning of the system is carried out by a qualified air conditioning engineer.

We absolutely DO NOT recommend that the system is filled from 'cans' of R134a. Step away from the ebay or Harbour Freight DIY fill kit and seek professional help.

	<p>PERSONAL INJURY, DEATH AND / OR PROPERTY DAMAGE HAZARD</p> <p>Failure to follow this warning could result in personal injury, death or property damage.</p> <p>Improper installation, adjustment, alteration, service, maintenance, or use can cause explosion, fire, electrical shock, or other conditions which may cause personal injury or property damage.</p> <p>Consult a qualified installer, service agency, or Classic Retrofit Ltd or assistance.</p> <p>Read and follow all instructions and warnings.</p> <p>Please consider your and other people's safety before installation.</p> <p>Disconnect the vehicle battery before installation!</p>
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Prerequisites

The kit has been designed to fit 911s where there is space under the front left headlamp for the condenser. Early cars (pre 1969) have lots of space here. Later, 'impact bumper' cars ('74 to '89) have a large washer bottle under the left fender which must be removed to accommodate the condenser.

Cars with two batteries (1969 to 1973) have limited space under the left headlamp, so may either require removal of the left hand battery box or positioning of the condenser ahead or behind the rear wheel. Please note that the rear mounted configuration has not been tested by us and that brackets and a stone guard will have to be fabricated. We do hope to have an off-the-shelf solution for these cars in due course.

The following table shows compatibility

Year	Model	Alternator	Other requirements
1965 – 1968	Short wheel base	Update to 90A unit.	Provide holes in bulkhead for air ducts.
1969 – 1973	Long wheel base 'Long hood'	Update to 90A unit.	Delete LH battery box or use alternative condenser placement.
1974 – 1983	'Short hood' 'impact bumper'	Update to 90A unit.	None.
1984 – 1989	Carrera 3.2.	OK. 90A fitted as standard.	Modification to inset foglight and valence bracket.

Updating the Alternator

Early vehicles must be updated to use the 90A alternator from the 3.2 Carrera. As the 90A alternator is longer, the fan housing needs to be machined deeper to accept it. This is not a difficult operation for a machine shop but does require some careful measurement so that the fan pulley is perfectly aligned with the crank pulley.

Updating the alternator also requires that the wiring can take the extra current. The wire from the alternator to the starter solenoid must be upgraded to 110A 16mm² wire along with the alternator ground to the engine case.

If you have a 964 or 993 based engine you are lucky enough to have a 115A alternator but it still requires you to check the wiring is up to spec. E.g. No good having a 115A alternator with a 1974 wiring harness!

Earth straps

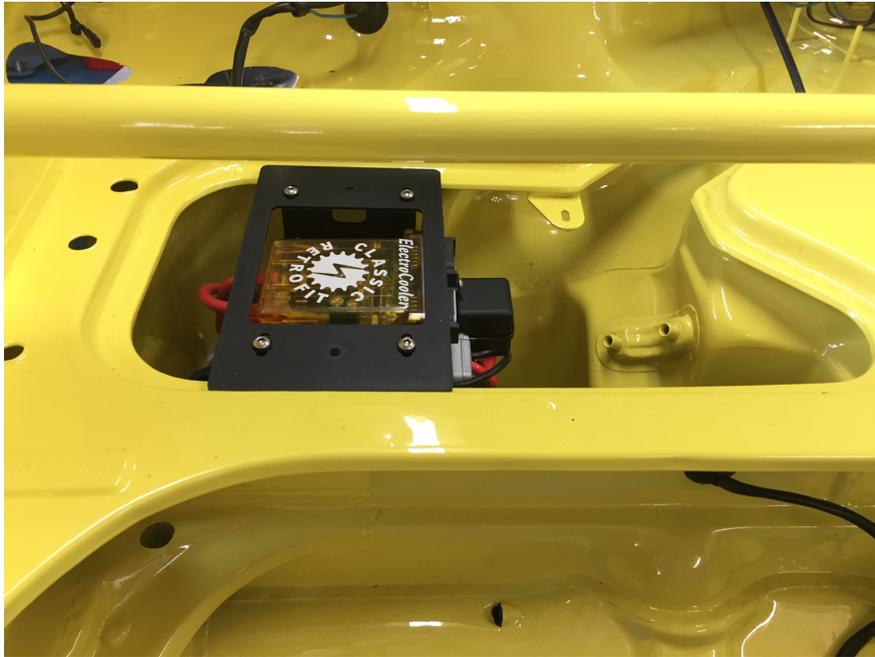
It is strongly advised to remove and inspect both the battery and transmission earth straps. The studs and landing surface of the earth point should be cleaned until shiny. It is important that the earth strap lug sits flat on the landing surface so that maximum contact area is achieved. The same is true for attaching the compressor earth.

Batteries

The kit has been tested with standard batteries typically 75Ah or greater. The battery must be in good order. The A/C will use some battery reserve at idle. If you have a lesser rated battery, you run the risk of depleting it sooner. Settings can be changed within the A/C ECU to guard against this at the detriment to A/C performance at low engine RPM. Please contact us regarding battery spec.

Smuggler's Box

On LHD vehicles, the 'smuggler's box' must be empty to mount the compressor. If you wish to use the smuggler's box for another purpose, you *can* use the RHD kit on a LHD car. On the RHD kit, the compressor lives ahead of the fuel tank.



LHD Installation in 'Smuggler's Box'

Preparation

The installation is not difficult, but some areas of the car (e.g. around the blower) are cramped and awkward to work in. Take your time and be methodical. The install can be undertaken with common workshop tools.

The only special tool required is the hose crimp tool. The hose crimps are 'oetiker' ear clamps. The tool required is readily available, cheap to buy and referred to as 'Oetiker pliers or pincers'.



Disconnect vehicle battery.

You will be connecting some fairly high current wires so please make sure the vehicle is electrically safe to work on.

If the vehicle already has factory or dealer fitted air conditioning, these parts need to be removed prior to the fitment of the kit. This includes:

- Remove the engine driven compressor and bracket.
- Remove the front and rear condensers.
- Remove all hoses and the drier.
- Remove the evaporator unit from the 'smuggler's box'.
- Removal of A/C specific hoses in under the scuttle area.

Condenser and Fan Assembly

The new condenser and fan assembly is suspended from the left hand headlamp bowl. On impact bumper cars this is in place of the washer bottle. An alternative washer bottle solution must be found and is not supplied in the kit. Have a look out for the Porsche 'intensive washer bottle' which was an option on the cars in the '80s. Many 'kit car' washer bottles can be used and also the modern electric variant of the T2 bus washer bottle.

Removal of washer bottle on impact bumper cars.

Remove front left wheel and washer bottle retaining strap. Note that the pump that is integral to the washer bottle on some cars is for the lamp washers, not the windshield. To gain access to the 'horseshoe' bracket bolt, remove LH headlamp, disconnect wiring and place aside. Undo bolts and remove 'horseshoe' support bracket.



Washer bottle and horseshoe support removed from LH headlamp area.

Fitting the new condenser assembly and drier

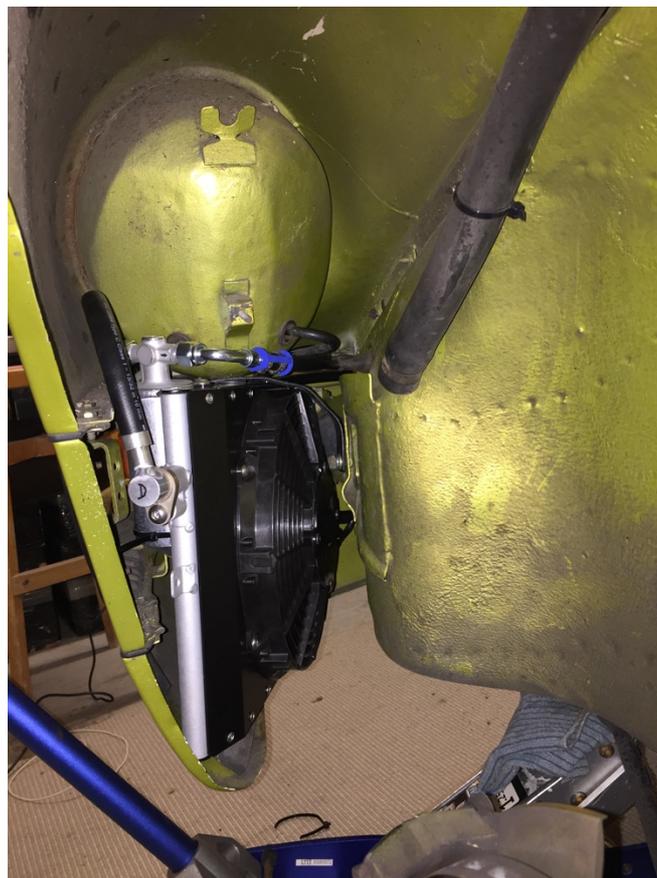
Before fitting the condenser assembly, familiarise yourself with the various grommet holes that are in the nose area. These are originally used to run wiring and washer bottle pipes though to the luggage bay. On most impact bumper cars, there are sufficient openings to run wiring and the thin

wall a/c hoses through these holes with a suitable grommet. Certainly, on our test mule, the A/C is installed without cutting ANY additional holes in the body shell. Hoses can even run inside the bumpers and come in through existing holes in the front bulkhead.

Remove the LH headlamp if not removed already. Offer up and loosely fit replacement horseshoe bracket. Fit new drier to horseshoe loosely with cable ties. Fit condenser assembly, push retaining bolt up through horseshoe bracket and headlamp bowl. Loosely secure with nut and washer from above. The condenser assembly can slide fore and aft to allow for adjustment. Use neoprene tape to protect paint where condenser touches valance at corners. We suggest leaving the fastenings loose until the a/c hoses have been fitted as you will probably need to jiggle things around.

The condenser is a pretty tight fit and the cars are hand built so tolerances will vary. You can trim back the ridges on the bracket that holds the impact bumper damper. You may have to get a little creative with the positioning. It is possible to angle the condenser a little by securing the bolt to the horseshoe bracket rather than through the headlamp. This may require modification to the bracket. Above all, please check clearance to front tyre!

Wiring for the fan can go through to the luggage bay near the battery to be connected to the A/C loom later.



Condenser and fan assembly fitted. It's tight!

Cabin Controls

Push button placement

We supply a single push button switch with led ring illumination. The switch is a momentary push button and the LED is used to indicate A/C status. The switch and harness is pre-wired. Some 911s have a blanked off switch hole on the dashboard near the wiper/light stalks. If you use this hole it will need careful opening of both the front vinyl AND the metal work behind. The suggested approach is to enlarge a little very carefully with a stepped metal cutter, then finish by hand with a round file. Carefully does it!



Discrete control button placed in blank to the right of heater sliders.
The ring led indicates A/C status.

You might have a centre console with original A/C controls. Because our system does not have a separate fan and the temperature is climatically controlled, these controls no longer make sense. Leaving them there causes no harm, or you could blank off that panel and add our control button there.

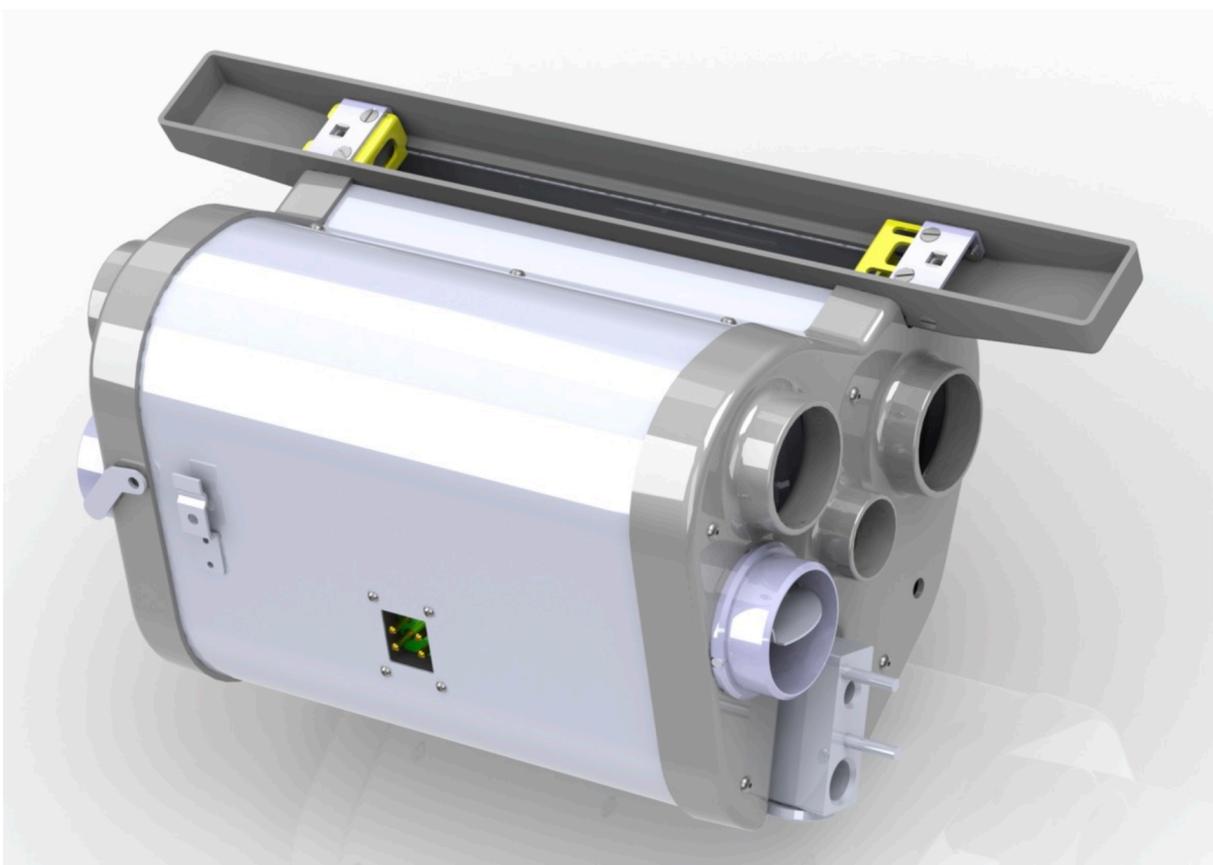
Control button cable routing

Please note that if the control button is already attached to the cable, it must be secured to the fascia panel first. Pass the cable through the front of the fascia panel. Also pass the cable through the securing nut and washer, then fasten the button. If you fail to do this, you won't be able to mount the button without desoldering all the connections.

On the bulkhead (behind the radio) there are a couple of factory plastic grommets. You can remove one of these to route the control cable through to the luggage bay. This is easier when the old fresh air blower has been taken out. Use a rubber grommet on any through holes for the wiring.

Repurposing the existing ductwork

The Electrocooler system for the 911 replaces the existing fresh air blower with a new design that has a modern fan and evaporator inside.



CAD model of the new blower unit with evaporator and fan inside.

The new blower still uses the existing blend valves (the two black parts with the cables attached) but modifies their function to facilitate recirculating cabin air. With the revised scheme, the hot air outlet into the footwell becomes an inlet. The new blower has inlets at the rear, allowing air to be extracted from the footwell area. A/C cooled air is pushed out into the cabin and drawn back in to the blower via the footwells, creating an effective air flow circuit.

We have made it as simple as possible to re duct the front of the car but it can be fiddly. Hopefully we have laid these instructions out in an order that will prevent any rework. Please do email us if you have any questions or install tips though!

Removal of Existing Fresh Air Blower

Remove the large centre section of carpet from the front luggage bay to expose the cardboard blower cover. Locate the screws for the cover and remove. Remove also the scuttle support bracket to gain access to the fresh air blower. Please note the blower cover cannot be refitted when the new A/C blower is installed. The carpet, however, should still fit back into place without the cover installed.

Undo the 4 air intake screws on the scuttle mesh and remove to gain access to the blower plenum fixing screws – undo these and remove.

Disconnect the 60mm hose clips that connect to the blower and remove the hoses. Undo the Bowden cable nut and clip and detach Bowden cable. Pull the lower part of the blower plenum forward and remove the drain hose underneath. Disconnect the electrical plug and remove the complete blower unit and plenum from the car.

Remove the plastic steering column cover (two push fixings towards the rear). The bottom of the new blower is deeper than the original so the cover will either need notching or cutting into two halves.

You now should have good access to the bulkhead.

Things to do with good access to the bulkhead.

Some things to do when you have access to the bulkhead area:

- Identify an access hole to the cabin and run A/C control switch loom
- Wire in the sense line for any high current accessories (e.g. wiper and rear defogger)
- Make sure that heat vent sliders are working and adjusted correctly. Two of the cables are on the back of the blend valves and cannot be reached once the blower is in.
- Replace the intermittent wiper relay if your wipers don't park!



With old blower removed, identify holes for cabin wiring and wire sense lines to high power accessory switches.



Attaching a 'piggy back' sense wire to the rear defogger switch. This tells the A/C to cut back on power if this is switched on.

Addition of recirculation.

The aim is to insert a 'T' branch each side into the 60mm duct that runs between each heat blend valve and the heat source in the footwell sill/rocker. The 'T' piece provided should sit just above the opening to the footwell, but still in the luggage bay. The branch of the T will provide the recirculation function to the inlets at the back of the new blower.

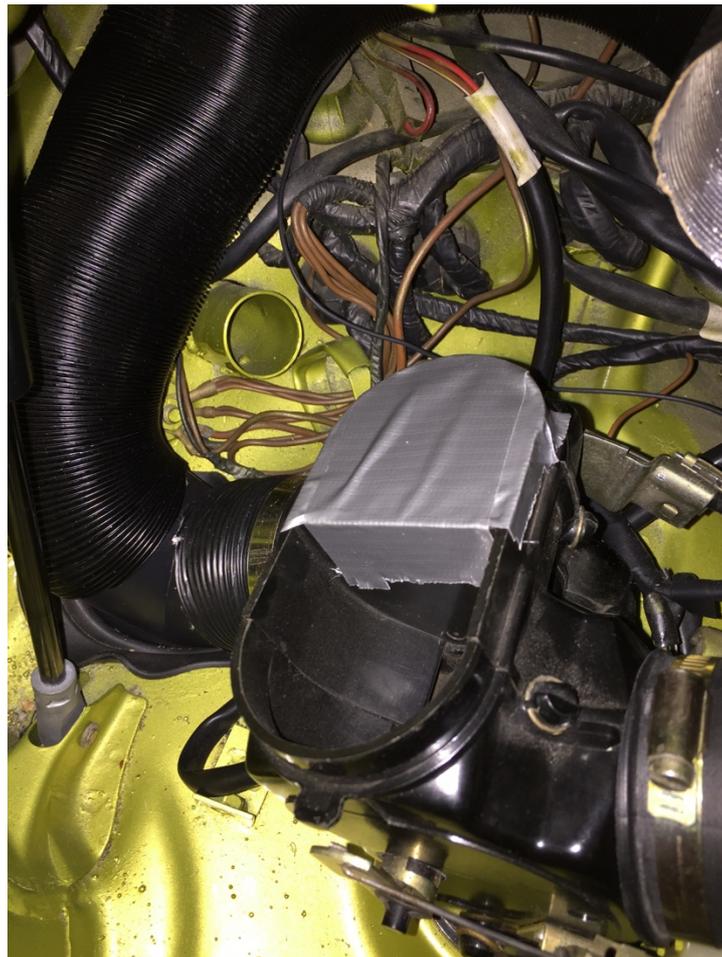
[Note: Up to and including the SC, this is a single piece of duct, On the 3.2 Carrera, there is a blower either side in the footwell. The replacement blower with the kit will provide some 'pull' of hot air from the engine so the footwell blowers can be removed – often these are seized. Block off the separate hot air inlet in the side vent using duct tape]

From the side of the luggage bay, loosen the 60mm hose clips from the left and right side heat inlet ducts (the ones that disappear through the rubber seal into the footwells)

From inside the car, fold back carpet from side of footwells to expose the other end of the same 60mm heat duct. Remove the heat duct. On 3.2 Carreras, the footwell blowers may also be removed as the new blower assists drawing heat from the engine. Whether it is advisable to also remove the engine blower is down to personal preference. How hot do you like it?

Replace the removed piece with a slightly shorter 60mm pipe, run this from the lower sill/rocker tube in the footwell to opening in the firewall. From the top (inside the luggage bay) insert the 60mm 'T' piece as the hose passes through the firewall rubber seal so that the 'T' sits just topside of the firewall. Continue the hose to the blend valve and connect with a short section of hose. It is a cramped area to work in so it can be helpful to loosen the blend valves by undoing the two screws from under the footwell. Secure as necessary – it is fairly tight here so hose clips are not essential.

Connect a 60mm duct to each 'T' and direct up and back. Secure with a clip, if necessary..



left of picture, the 'T' piece sitting in the bulkhead gasket with 60mm branch heading upwards.

Side / Auxiliary vents

The new blower has a 40mm spigot either side for supplying air to side vents where fitted. Over the years, Porsche used many different sizes of hose for the side vents. We chose 40mm as it is adequate for airflow. Connection to existing hose or body tubes can be accomplished through wrapping the duct/tube in neoprene tape to get an air tight seal.

On an SC, there are two metal tubes welded into the body that supply air to the side vents. The tubes are actually less than 40mm. Wrap a length of neoprene tape around the tube to make it up 40mm in diameter. Push on the 40mm duct and secure with tape or a hose clip.

On a 3.2, Carrera or Turbo, and A/C cars, locate side vent hose and use the neoprene tape to connect the 40mm hose into the existing hose. Wrap with duct tape.

On cars without centre vents, the 40mm spigots can be used for supplementary cooling as required. Route as you see fit.

Block off back half of blend valves. Undo the spring clips and remove the top part of the blend valve (the part with the short duct that connects to the screen vent). The valve is divided into two halves. Using duct tape, block off the rear half that is nearest the windshield.*



Blocking off the rear of the blend valve duct. Do this for both sides. Don't worry, you will still get warm air to the screen. You can also see the SC type side vent tube which is part of the bodywork. Connect 40mm tubing here.

* Why am I doing this? Blocking the rear of the blend valve allows the bottom slider in the car to control the recirculation function. In the 'screen' position, the blower will draw air in from outside. In the 'DEF OFF' position, the blower will pull air from the footwells.

Fit new blower

Prior to fitting the blower, fit the sense wire for the rear screen defogger or any other high current circuits. Identify the rear demist switch and find the terminal that goes live when the defogger is on. Using a piggy back spade, connect a wire (2m should be sufficient) here for use later.

Make sure that the blower drain tube is fitted to the correct side for your vehicle.

Find the blower electrical plug so it is not lost behind the blower when installed. Connect it to the new blower before the ductwork gets installed. (It is worth doing a test of the blower on all three speeds at this point).

Make sure that, on vehicles with central vents, the plastic vent funnel is correctly positioned before installing the blower. There is a small tab on the body for securing this part and its duct with a hose clip.

Now that the ductwork is connected but not trimmed, offer up the new blower. It is a tight fit and there is a certain knack to getting it in! Lay the blower on its back and put the driver's side in first, then rotate the top forward into the scuttle vent opening. Secure the blower using the two screws through the vent opening as per the original. Make sure the drain tube is aligned with the plastic tube (LHD) or body opening (RHD)

[Note: On LHD vehicles with brake servos/boosters the A/C refrigerant hoses when installed are very close to the brake warning light switches. It can be prudent to make up and connect the hose ends at the expansion block, prior to blower install.]

Starting at the rear of the blower cut the 60mm recirculation ducts (from the 'T' branch) to length and secure to the blower. On cars with central vents, on the passenger side, the 60 duct must be squashed slightly and fed over the short duct to the screen vent.

On the scuttle panel, there is tab which was used to attach the scuttle support stay. It has an M5 thread. This can be bent towards the front of the car so that it is parallel to the top of the blower. Screw in the the M5 rubber foot so that it rests on the top of the blower to provide support for the scuttle panel.



'T' piece in place (bottom of picture) with branch running to inlet of new blower.



On cars with centre vents, on passenger side the duct must route over the screen duct. Gently squash the duct and push it up under the scuttle area. This is a RHD car. On a LHD, the squashed tube will be on the left hand side



Pushed under the scuttle, the 60mm recirculation duct runs between the 'T' and blower inlet.

Cut to length and connect the 40mm side vent ducts to blower.
Connect the front lower outlets to the heat blend valves with 60mm duct and secure.
On cars with centre vents connect the top outlet to the fresh air funnel.
Block off all unused air outlets.
Reconnect battery and test blower.



Finished install RHD (prototype blower shown)

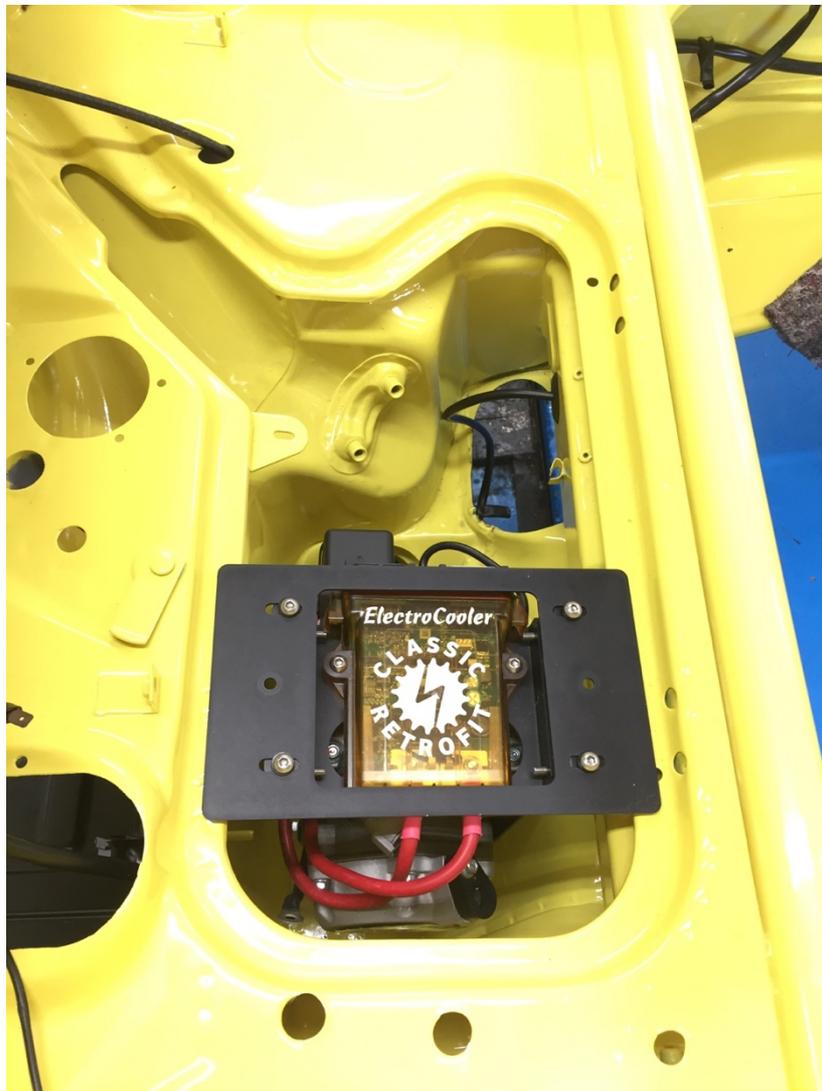
Compressor.

If you connected the battery to test the blower, please disconnect it again.

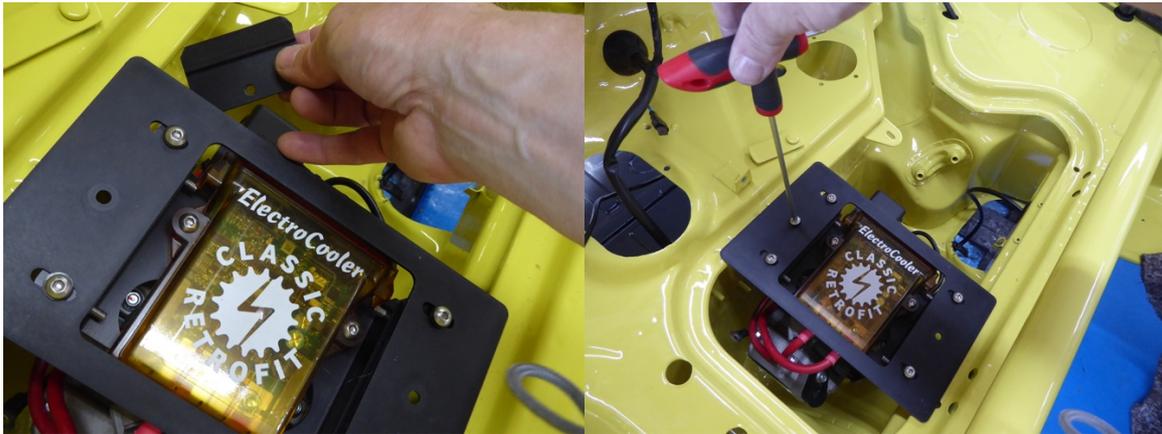
Left hand drive / Smuggler's box install

Before installing the compressor, locate a suitable electrical earth point in the smuggler's box. The earth point should ideally be an M8 stud and be taken back to shiny metal. We are not kidding, this earth and the other earths in the car need to be excellent.

Fix top plate loosely to cradle so it can slide fore and aft. Position in smugglers box allowing enough room for at the front of the compressor for hose attachment. The compressor should not be touching any metal work in the smuggler's box. Tighten the top plate fastenings when you are happy with the position.



The clamps are used to secure the compressor cradle. It is probably best to do the final clamp down after the hoses have been fitted (as you may want to lift the compressor to attach the fittings).



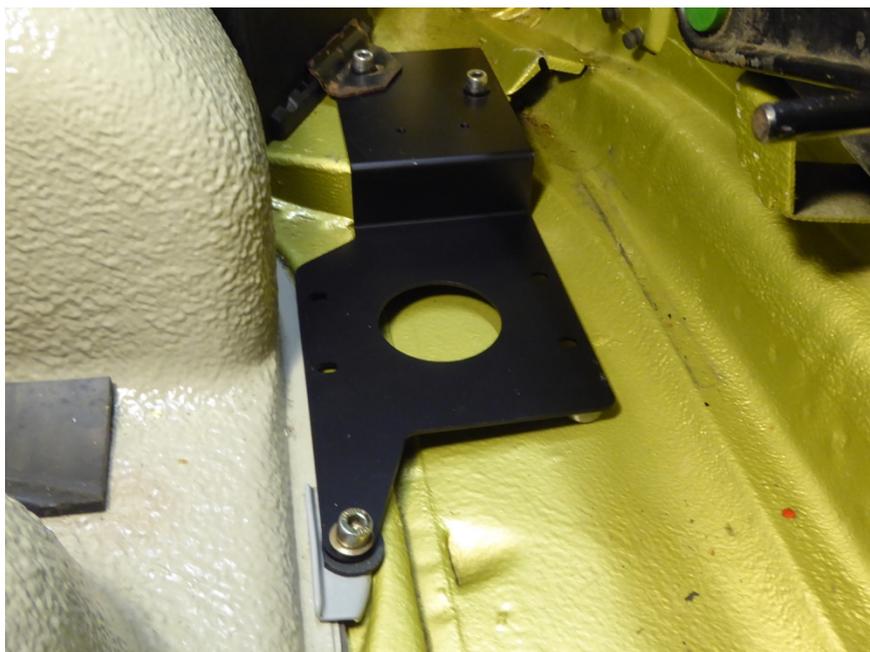
Right hand drive / Ahead of fuel tank box install

Remove battery clamp and bolt from base of battery. Remove the other bolt that is in front of it.

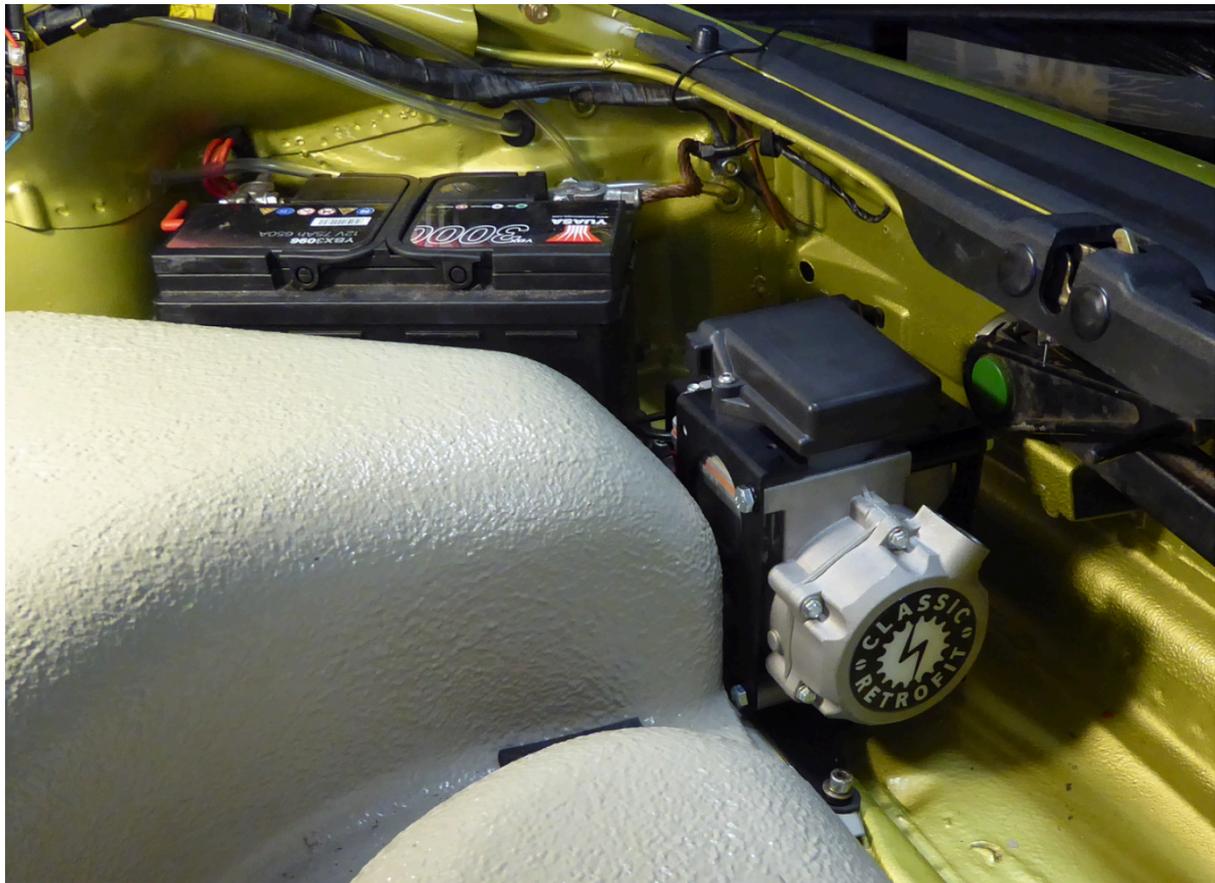
Offer up the compressor mounting plate to the car. The plate is designed to mount on three standard holes in the car. These are the central fuel tank bolt, the battery clamp bolt and an additional bolt hole in front. The front most hole is used as an earth. Make sure this earth is clean and bright (run a tap down it if it is rusty or dirty).

Place M8 rubber washers under the plate at each bolt position, then put the plate in place.

Adhesive rubber feet are used to level the plate on the uneven surface ahead of the fuel tank. Use two feet on the fuel tank side at the back. The large foot should go on the left corner at the front. Experiment with the best placement for the feet so the plate does not wobble before removing the adhesive backing. Then take the plate out and attach the feet.



Out of the car, attach the plate to the bottom of the compressor. Also attach the relay bracket to the plate. The assembled unit can now be placed in the car.



Insert the 3 M8 bolts using the washers provided. The thick black wire from the compressor **MUST** be attached to the forward bolt.

The relay bracket can now be attached to the bracket using the M6 button head screws.

Routing Hoses

There are many ways of routing the refrigerant hoses, refer to plumbing diagram in Appendix A for the basic circuit. Identify the fittings noting that there are two different hose sizes (#6 and #8) used. Some fittings have the same port size but different hose size (e.g. on the condenser) The larger #8 hose is used between evaporator and compressor and between compressor and condenser only. Make sure you have the right size fitting for the hose

Position of charge ports is up to you and dependent on installation. Dry fit the hoses without the clips and cut hoses to size for your installation.

Tip: You use cheap garden hose to work out run lengths first before cutting the actual hose!

On a RHD G model, routing can go inside the car, down the inner wing, although a little condensation can be expected. On a LHD, hoses can be routed through the hole in the bottom of the smugglers box to head towards the condenser.

Crimping the hoses. Please refer to the following video for instructions on how to crimp the connections.

<http://www.burgaclip.com/content/6-instructions>

Wiring

High Current Cabling

Refer to Appendix B for the heavy cable wiring.

The red and black 16mm² heavy cable is the main supply of current to the compressor. It is isolated by the large contactor relay and also fused by an 80A inline fuse.

The connection of the red supply cable between the battery + and contactor **must** be fused with the supplied 80A inline fuse. For safety, the connection of this cable to the battery should be the last you do on the install. This wire can carry up to 50A so it is important that cable cannot be pinched or the insulation chafed or broken.

We strongly advise to put the fuse as near as possible to the battery. In the event that the red cable is shorted to ground, the fuse will blow.

Of course, make sure all connections have good contact are securely fastened.

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The ECU wiring loom is in two parts and the connectors coloured grey and black are 'keyed' so cannot be wrongly installed at the ECU end.

Black Loom

Plug the black connector into the ECU. Identify the short spur with the 5 ground wires that are terminated in an earth lug. Find a suitable earth point for this and attach. The remaining spur needs to connect to the cabin control cable (BLK/WHT and BRN/YEL) and the blower (ORG). Route the loom in the car to your liking before trimming to length and attaching with spade connectors.

Grey Loom

Plug the grey connector into the ECU. Identify the spur with the white and grey wires. Refer to Appendix C for how to wire these to the Contactor (GRY) and Fan Relay (WHT). Route the harness and trim accordingly. Note that the relay socket for the fan relay is provided in the kit.

The contactor relay has a protection diode. The grey wire MUST be attached to the spade terminal on the correct side of the diode (marked with a bar on the diode).

Take the remaining spur to the fuse box area. The red wire should be wire to the fused side of permanent live. The yellow and yellow/black wires are wired to ignition live.

The only remaining wires are blue/white, blue/yellow and blue/red.

Remember the wire you connected to the defogger switch? Connect this to blue/red. Connect blue/white to the main headlamp fuse. Connect blue/yellow to the wiper feed.

Temperature Sensors

There are two temperature sensors, Cabin and Evaporator which have a 4 pole connector that plugs into the grey harness. Identify which is which by the colours at this connector (grey/red is evaporator, grey/yellow is cabin).

The easiest way to install the sensors is to pierce a small hole in the 60mm ductwork and push the sensor through, then secure with tape.

The evaporator sensor should go into one of the ducts at the top of the blower as near as possible to the blower.

The cabin sensor should go into one of the ducts just above the

Setup

Please refer to our separate setup manual for test and commissioning.

Filling Procedure

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The system uses standard R134a charge ports. Test the system for leaks with nitrogen at pressure and check that it holds for 30 minutes.

DO NOT add compressor oil. The compressor is pre-filled with PAG oil. Although this is an electric compressor, it does not need special oil as it is a 12V system.

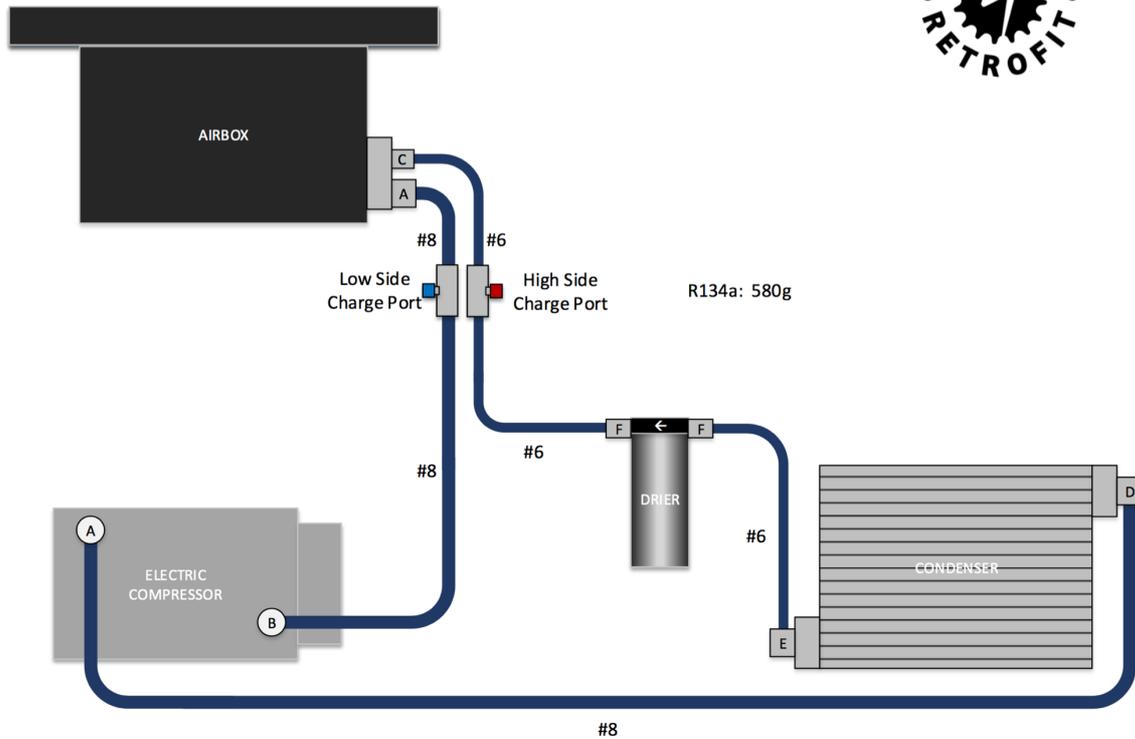
The system can be filled without the compressor running.

Fill with 580g of R134a. Typical Lp and Hp values show (in mbar)

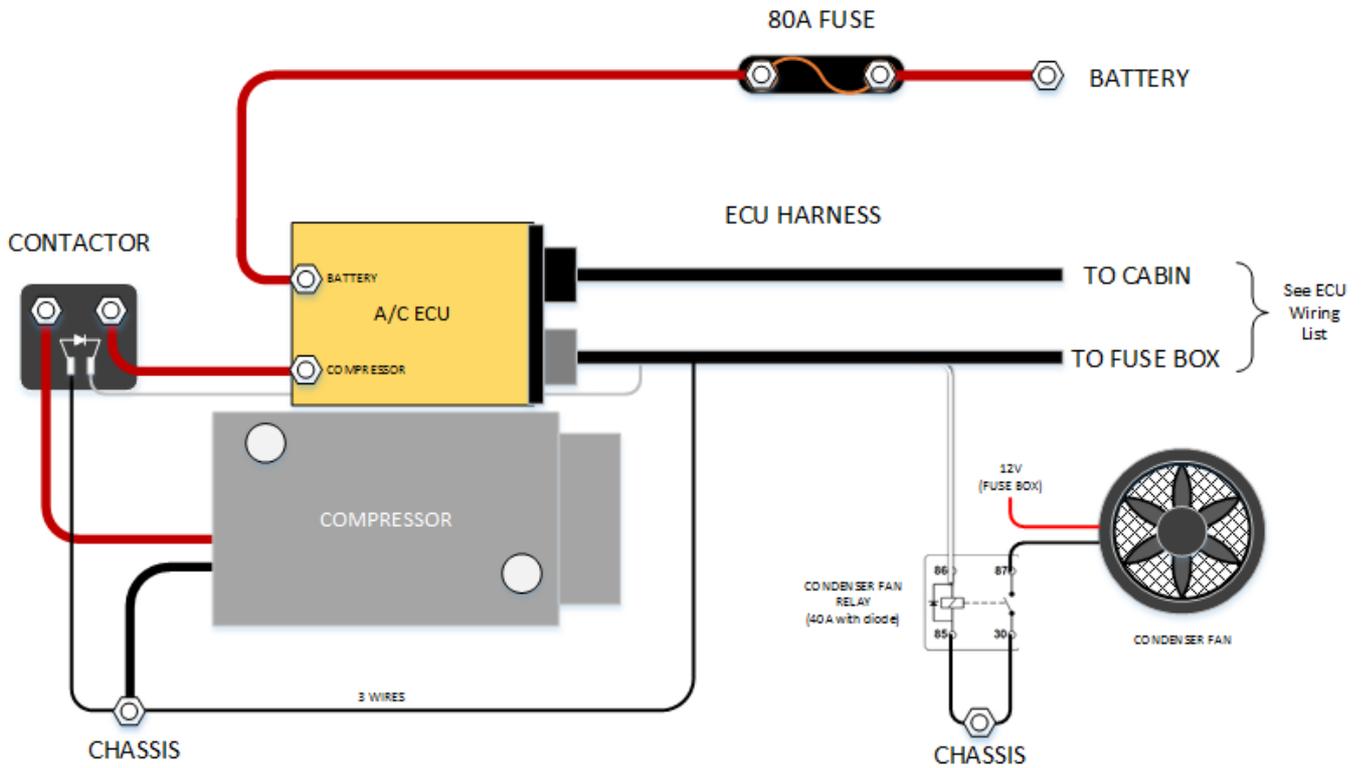


Appendix A. Refrigerant hose circuit.

Classic Retrofit Electrocooler Refrigerant Hose Plumbing



Appendix B. Wiring and ECU



Power Connections

16mm² 170A wire.

Red from battery with 80A inline fuse to input terminal on ECU. ECU Output terminal to contact breaker (relay). Other side of contact breaker to compressor 12v Red.

ECU, contactor and inline fuse have M6 studs. Peripheral connections at battery terminal are typically M6 too.

Use 16mm² M5 crimp terminals for ECU and fuse connections.

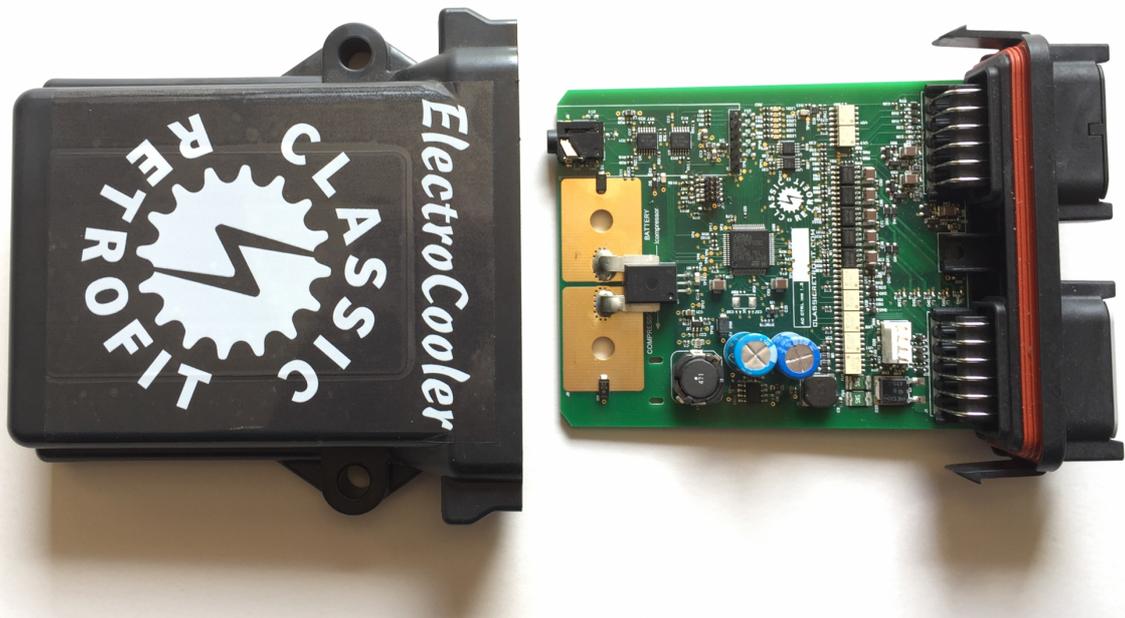
Use 16mm² M6 crimp terminals for contactor relay.

Compressor Gnd (black) to chassis.

ECU and Connections

ElectroCooler's ECU provides the necessary control to regulate the compressor speed in accordance to the power available from the charging system. Without the ECU, the compressor could run beyond the means of the alternator which would result in a flat battery. Either that, or the compressor would be run too slow and compromise the A/C performance.

The ECU contains an algorithm that adjusts the compressor speed (and thus current) based on alternator output, battery voltage, driving conditions and a number of other factors.



The ECU comes preset with typical working parameters for a 911. It is possible to adjust the values using a laptop as described in our setup manual. It is strongly recommended NOT to adjust these values without consulting us first.

The ECU is housed in an automotive enclosure and has two keyed 12 way Deutsch connectors, accepting female 0462 crimp contacts.

All wiring to ECU to be 14/0.30mm, 1mm²., 8.75amp.

Grey Connector.

Pin	colour	Function	Typical install
1	red	Vfan	Permanent Live
2	Green/red	GPIO1	nc
3	Green/yellow	GPIO2	nc
4	Green/white	GPIO3	nc
5	blue	ACcool	nc
6	Blue/yellow	ACdefeat2*	Main beam*
7	Yellow/black	VacControl	Switched Live
8	Blue/red	ACdefeat1*	Wiper Full Speed*
9	yellow	IGNon	Switched Live
10	Blue/white	ACdefeat3*	Rear Screen Demister*
11	white	FANpwrenable	Condenser fan relay
12	grey	COMPpwrenable	Contact breaker relay

* The 3 defeat signals tell the ECU whether to slow or stop the AC compressor. Wire them to the 12V feed for higher current accessories. In the above example, they are on the main beams, wiper full speed and the rear screen demister. These connections are not mandatory, the ECU can operate without them.

Pins 11 and 12 both provide 12V to the relay coils. It is expected that the other side of the relay coils are connected to chassis. Please note that the relays MUST have coil diodes fitted and the polarity of the connections is important (see electrical diagram).

nc – not connected

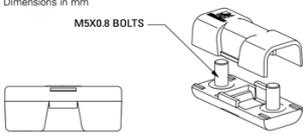
Black Connector

Pin		Function	Typical install
1	Brown/red	STATUSOp1	nc
2	Brown/yellow	STATUSOp2	Cabin control led
3	Grey/red	EVAPTemp	Temp sensor
4	Grey/yellow	CabinTemp	Temp sensor
5	Black/blue	ENCb	nc
6	Black/white	ENCSwitch	Cabin control button
7	orange	BLOWposn	+ve on blower motor
8	black	GND	Chassis
9	Black/red	ENCa	nc
10	black	GND	Chassis
11	Brown/white	StatusOp3	nc
12	black	GND	Chassis

Your harness may not have a full set of wires depending on the installation. We supply the harness unsheathed for custom installations. Please group the wires and sheath them to suit your installation.

Appendix C. Part numbers

Photo	Description	Mfr Part Number	RS Stock Code
	PFL PCB Case	Deutsch EEC-325X4B	724-2557
	Contactor: 12V Extra Heavy Duty Make/Break Relay - 100A	Durite 0-727-10 -or- Cargo 160477	n/a
	DTM Series, 12 Way Plug Connector, with Crimp Termination. Grey	Deutsch DTM0612SA	724-2576
	DTM Series, 12 Way Plug Connector, with Crimp Termination. Black	Deutsch DTM0612SB	724-2579
	DTM Series Wedge Lock For Use With 12 Way Plug	Deutsch WM12S	724-2573
	0462 Crimp Contact, Female, Crimp, Nickel Plating 20 - 24 AWG	Deutsch 0462-201-20141	425-822
	Crimp Tool DT Series, HD10 Series, HD30 Series, HDP20 Series, 20 → 12 AWG Wire Size	HDT-48-00	425-973
	Uninsulated Tin Plated Tubular Ring Terminal, M5 Stud Size, 16 mm ²	RS Pro	122-5002

	Uninsulated Tin Plated Tubular Ring Terminal, M6 Stud Size, 16 mm ²	RS Pro	531-043
 <p>Dimensions in mm MSX0.8 BOLTS</p>	100A Midi fuse holder	Littelfuse	04980921GXM5

For RS stock numbers listed - please go to uk.rs-online.com